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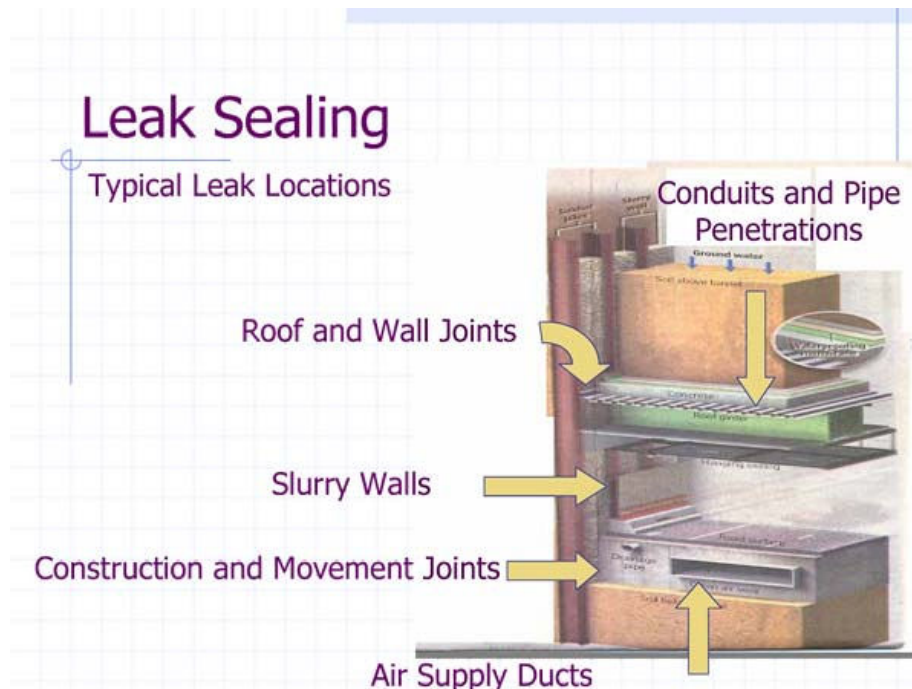
Tunnels Water Infiltration Response Summary and Board Recommendation
Presented to MassDOT Board of Directors
July 13, 2011
Frank DePaola, MassDOT
Highway Division Acting Administrator

Let me first state that the tunnels are safe. There has been a lot of information on water infiltrating into the tunnel over the past several years. I would like to share with you the current status of this issue and possibly dispel some of the misinformation that is out there. The quantities can be deceiving. Collected across miles of tunnel and accumulated over a year the numbers sound large. While regulatory agencies focus on quantity, the effects of the water to the long term viability of the tunnels is more about the location of the water infiltration and not the quantity. In the interest of public safety, the primary focus of leak sealing work has been to keep the water off the driving surface. Relatively small amounts of water can cause conditions such as ice on the roadway. The second priority is to protect the tunnel support systems, both structural and electrical from the corrosive effects of the water.

The I-93 leak sealing program has successfully managed the infiltration of ground water in the O'Neill tunnel. It is important to note that the expectation is that managing the infiltration will continue to be part of the on-going maintenance of the tunnel. With the change in seasons, the tunnel will expand and contract with temperature changes. The ventilation system in the tunnels is strong enough to bring outside temperatures to the tunnel interior. The result is that every winter the structure contracts and re-opens many of the existing points of water infiltration in the roof, walls and base slab of the tunnel. Additionally, the O'Neill Tunnel reaches depths of 120 feet where the water pressure on the outside of the structure is significant.

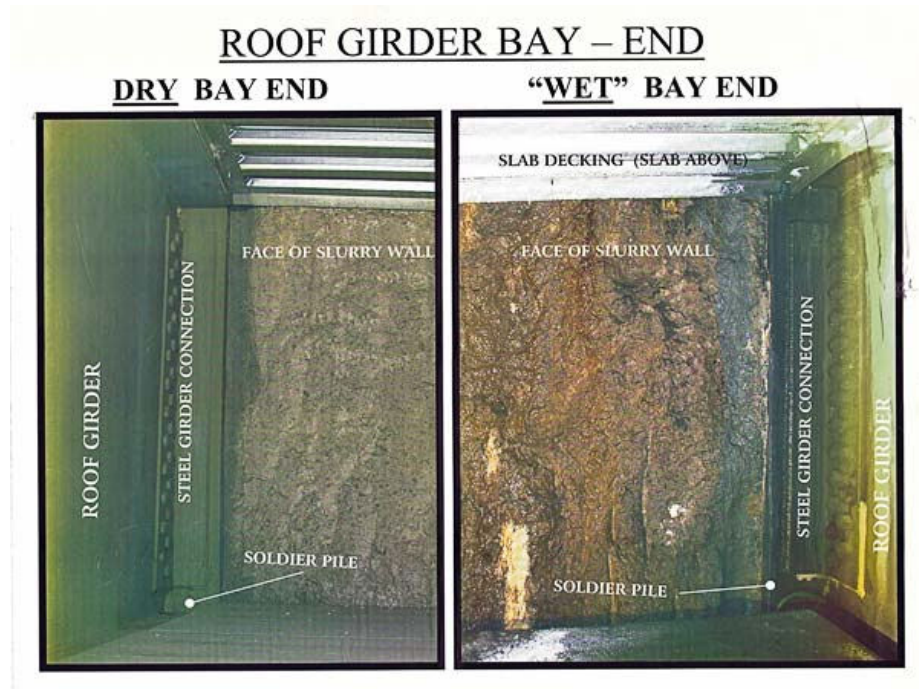
What is infiltration?

This graphic shows a typical I93 tunnel section. It also shows the five most common locations where infiltration is encountered in the O'Neill Tunnel. Groundwater infiltrating into the Supply Air Ducts and/or from construction joints in the base slab are responsible for a substantial amount of infiltration. These however are below the roadway and do not pose a threat to the tunnel systems. The slurry walls, conduits and roof/wall joints all enter above the roadway and often on or near tunnel systems. These are the top priority of the water infiltration management effort. The most common location is in the roof girder bays at the roof/wall interface.



Roof Girder Bay End

The I-93 tunnel has approximately 10,000 locations where the roof girders supporting the tunnel roof and the soil above, connect to the structural wall system. This graphic shows typical conditions in two different bay ends. The image on the left shows a dry condition as per the design intent. The image on the right shows a wet bay end where the water flow is evident. As you can see it is a little more than a damp condition, but has the potential to cause corrosion if not addressed. The structural steel connection between the 5 to 6 foot tall girder and the soldier pile imbedded in the slurry wall must not be allowed to deteriorate. The crews work on these migrating leaks all year around with an annual increase as the temperature drops in winter. We are making progress in reducing the total amount of water infiltrating into the tunnel.

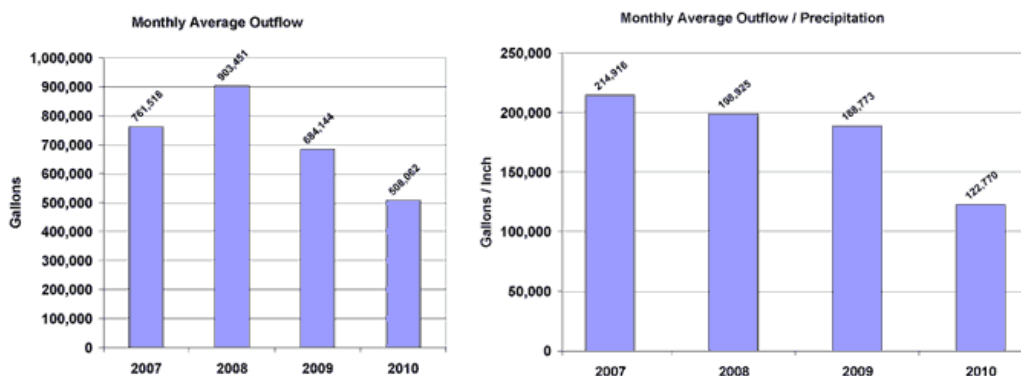


Water Infiltration Trends

The program is showing an annual decrease in overall amount of water being pumped from the I-93 tunnel. The total amount of water pumped from the tunnel has decreased from an average of 903,000 gallons per month in 2008, to 500,000 gallons per month in 2010. To put this into perspective, 500,000 gallons in a month is equal to 12 gallons per minute, which is equivalent to amount of water that you would get from three (3) garden hoses. This graphic shows that when precipitation is accounted for, there is still a steady decrease in the volume of water entering the tunnels. The volume is expected to continue to decrease until the tunnels reach a steady state. At that time, it will still be necessary to manage the infiltration. It is hoped that the annual cost will have decreased by that time.



I-93 Tunnel Outflow Trends



S. Tarantino -April 8, 2011

Staff Summary

This Board Action asks the Board to authorize the Secretary and/or the Administrator for the Highway Division execute a change order to Contract #60238 with J.F.White to add an additional \$7,120,597.00 to continue the contract work. These increases will provide for the funding of sufficient quantities of work items on this contract and allow it to continue until the next contract commences in the beginning of next year.

This work was originally approved under Trust Fund Request CRC#1 in August of 2008 and was awarded to J.F.White Contracting Corporation by the former Turnpike Authority. The work was scheduled for 3 years with a completion date of November 27, 2011. The work under this Contract is of a corrective and preventative maintenance nature for the purpose of maintaining the I93 Tunnel facility. The work involved includes leak repairs; fireproofing repairs; slurry wall repairs and concrete pavement repairs. These items have been packaged together to maximize coordination in the field and optimize the quantity of work that can be done within a lane closure. It is necessary to keep these activities going until a new Contract is developed. This work employs an average of about 30 tradesmen, full time, throughout the year. This work also supports MassDOT's sustainability initiatives by decreasing groundwater inflow and decreasing flows to the MWRA system.

Presently, the estimated value of the next contract is \$45 Million for a period of 3 years.

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